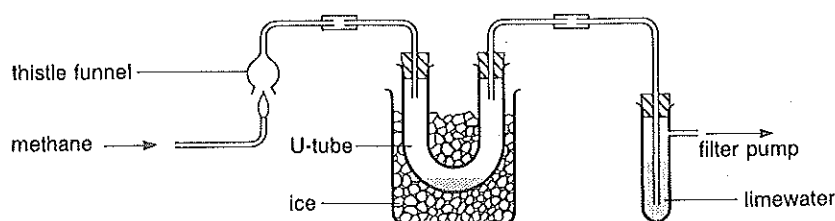


14.2 The combustion of alkanes



Alkanes are hydrocarbons. They have the general formula C_nH_{2n+2} . The first four members of the homologous series of alkanes are:

n	alkane	formula	state
1	methane	CH_4	gas
2	ethane	C_2H_6	gas
3	propane	C_3H_8	gas
4	butane	C_4H_{10}	gas

Candle wax and polythene are also alkanes with n in tens for wax and in thousands for polythene.

When alkanes burn they are oxidized to carbon dioxide and water.



Aim

To investigate the combustion products of methane.

Apparatus and materials

Stand, clamp and boss
Two thistle funnels
Delivery tube with a jet
Rubber tubing
Two U-tubes fitted with bungs and delivery tubes
Beaker to hold U-tube
Test-tube with side arm fitted with delivery tube and bung
Filter pump
Limewater
Anhydrous copper(II) sulphate
Ice

Procedure

- 1 Assemble the apparatus as shown above.
- 2 Adjust the flow of water through the filter pump to produce a steady flow of air through

the apparatus.

- 3 Adjust the gas supply to produce a small flame of burning methane at the jet. Place the jet under the thistle funnel.
- 4 Allow the methane to burn steadily for several minutes.
- 5 Test the liquid collected in the U-tube by adding a spatula measure of anhydrous copper(II) sulphate.
- 6 Examine the limewater for signs of change.
- 7 Examine the thistle funnel for any deposit.
- 8 Repeat steps 1–7 with fresh apparatus and without using methane. Draw air through from the thistle funnel.

Results

Copy and complete the following table:

	burning methane	air
U-tube		
limewater		
thistle funnel		

Questions

- 1 a) Air is used as a 'control' in this experiment. What is the function of a control?
b) Describe how anhydrous copper(II) sulphate can be used to test for water.
c) Compare the changes in limewater when air, and the gases from burning methane are passed through limewater.
d) What combustion product is deposited in the thistle funnel?
e) Apart from the use of anhydrous copper(II) sulphate how else may water be detected?
- 2 Write equations for the complete combustion to carbon dioxide and water of the following alkanes: methane, propane and butane.